Docket No.: 239522US0

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

IN RE APPLICATION OF:
NAOHIRO TODA, ET AL.

GROUP: 1795

SERIAL NO: 10/606,750

EXAMINER: DOTE, J.

FILED: JUNE 27, 2003

FOR: ELECTROPHOTOGRAPHIC PHOTORECEPTOR, METHOD FOR MANUFACTURING THE ELECTROPHOTOGRAPHIC PHOTORECEPTOR, AND IMAGE FORMING APPARATUS USING THE ELECTROPHOTOGRAPHIC PHOTORECEPTOR

DECLARATION UNDER 37 C.F.R. § 1.132

COMMISSIONER FOR PATENTS
ALEXANDRIA, VIRGINIA 22313

Sir:

Now comes Tasuya Niimi who deposes and states that:

1. I am a graduate of Chiba University and received my bachelor degree in the year 1984.

2. I have been employed by Ricoh Company, Ltd. for 24 years as an engineer in the field of electrophotography.

3. The following experiments were carried out by me or under my direct supervision and control.

The following photoreceptors were prepared.

(1) Sample 1

The procedure for preparation of the photoreceptor of Example 2 of the specification of the invention was repeated except that the average particle diameter of the TiOPc pigment,

which is prepared in Synthesis Example 1 and which is included in the CGL coating liquid, was changed to 0.15 μm by changing the conditions of the bead milling.

Thus, a photoreceptor sample 1 was prepared.

(2) Sample 2

The procedure for preparation of the photoreceptor of Example 4 of the specification of the invention was repeated except that the CGL coating liquid was replaced with the CGL coating liquid used for preparing the photoreceptor sample 1.

Thus, a photoreceptor sample 2 was prepared.

(3) Sample 3

The procedure for preparation of the photoreceptor of Example 4 of the specification of the invention was repeated except that the intermediate layer coating liquid was coated without applying ultrasound thereto; and the CGL coating liquid was replaced with the CGL coating liquid used for preparing the photoreceptor sample 1.

Thus, a photoreceptor sample 3 was prepared. The intermediate layer of this photoreceptor has a surface roughness of 0.2 μm.

(4) Sample 4

The procedure for preparation of the photoreceptor of Example 2 of the specification of the invention was repeated except that the average particle diameter of the TiOPc pigment, which is prepared in Synthesis Example 1 and which is included in the CGL coating liquid, was changed to 0.25 μm by changing the conditions of the bead milling.

Thus, a photoreceptor sample 4 was prepared.

(5) Sample 5

The procedure for preparation of the photoreceptor of Example 4 of the specification of the invention was repeated except that the CGL coating liquid was replaced with the CGL coating liquid used for preparing the photoreceptor sample 4.

Thus, a photoreceptor sample 5 was prepared.

(6) Sample 6

The procedure for preparation of the photoreceptor of Example 4 of the specification of the invention was repeated except that the intermediate layer coating liquid was coated without applying ultrasound thereto; and the CGL coating liquid was replaced with the CGL coating liquid used for preparing the photoreceptor sample 4.

Thus, a photoreceptor sample 6 was prepared. The intermediate layer of this photoreceptor has a surface roughness of 0.2 μm.

(7) Sample 7

The procedure for preparation of the photoreceptor of Example 2 of the specification of the invention was repeated except that the average particle diameter of the TiOPc pigment, which is prepared in Synthesis Example 1 and which is included in the CGL coating liquid, was changed to 0.45 μm by changing the conditions of the bead milling.

Thus, a photoreceptor sample 7 was prepared.

(8) Sample 8

The procedure for preparation of the photoreceptor of Example 4 of the specification of the invention was repeated except that the CGL coating liquid was replaced with the CGL coating liquid used for preparing the photoreceptor sample 7.

Thus, a photoreceptor sample 8 was prepared.

(9) Sample 9

The procedure for preparation of the photoreceptor of Example 4 of the specification of the invention was repeated except that the intermediate layer coating liquid was coated without applying ultrasound thereto; and the CGL coating liquid was replaced with the CGL coating liquid used for preparing the photoreceptor sample 7.

Thus, a photoreceptor sample 9 was prepared. The intermediate layer of this photoreceptor has a surface roughness of 0.2 μm.

The thus prepared photoreceptor samples 1-9 were evaluated by the same method as that mentioned in Example 2 together with the photoreceptors of Examples 2 and 4 of the specification of the invention and Comparative Examples 3 and 5 of the specification of the invention.

The evaluation results are shown in Tables 2-(2) and 2-(3) below.

Table 2-(2)

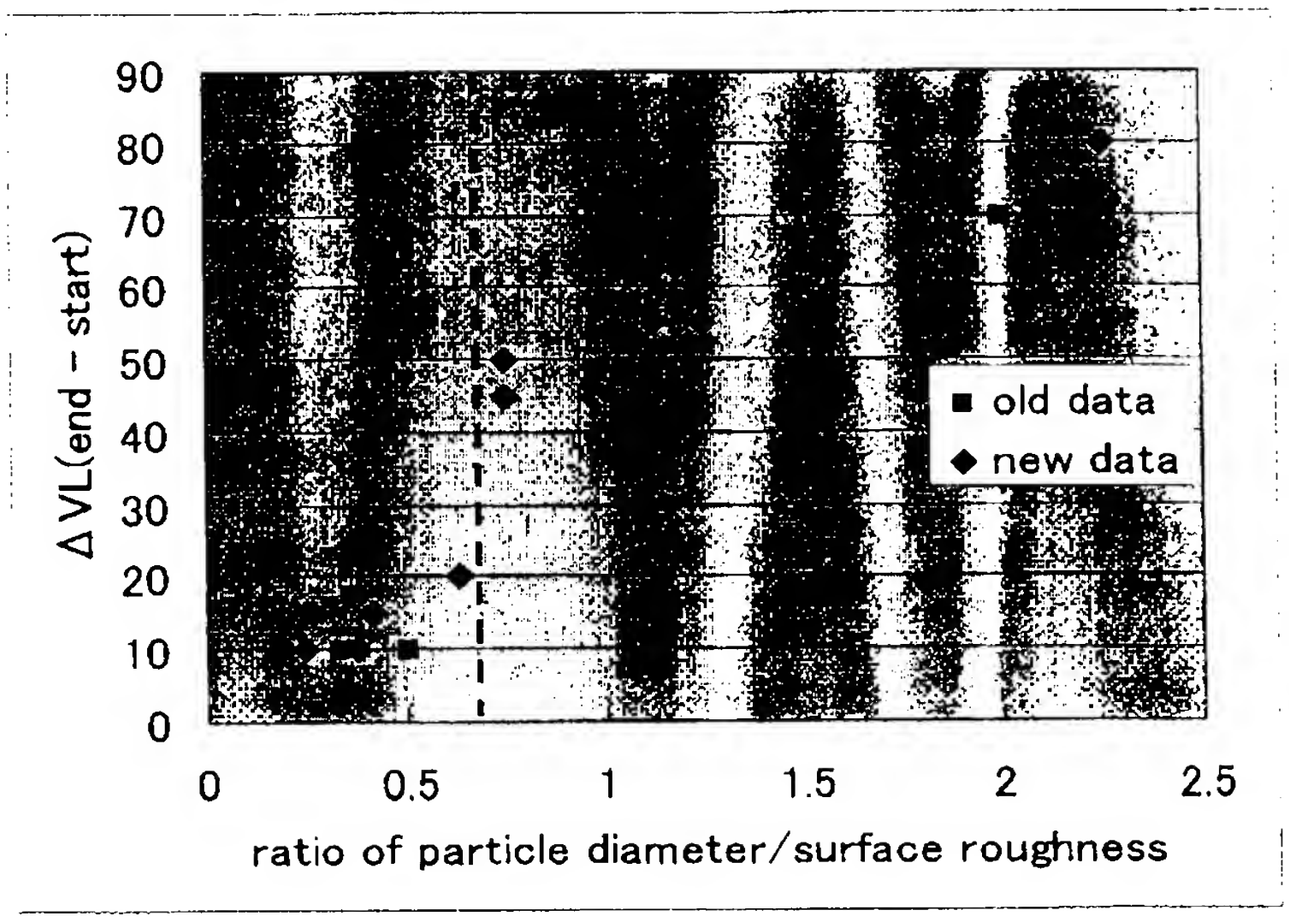
	Photo-receptor	Solvent of CTL coating liquid	Average particle diameter (APD) (μm)	Surface roughness (SR) (μm)	APD/SR*
Ex. 2	Ex. 2	THF	0.2	0.6	0.33
Ex. 4	Ex. 4	THF	0.2	0.4	0.5
Comp. Ex. 3	Comp. Ex. 3	THF	0.6	0.3	2.0
Comp. Ex. 5	Comp. Ex. 5	THF	0.6	-	-
					(≥6.0)
Ref. Ex. 3	Sample 1	THF	0.15	0.6	0.25
Ref. Ex. 4	Sample 2	THF	0.15	0.4	0.38
Comp. Ref. Ex. 1	Sample 5	THF	0.15	0.2	0.75
Ref. Ex. 5	Sample 3	THF	0.25	0.6	0.42
Ref. Ex. 6	Sample 4	THF	0.25	0.4	0.63
Comp. Ref. Ex. 2	Sample 6	THF	0.25	0.2	1.25
Comp. Ref. Ex. 3	Sample 7	THF	0.45	0.6	0.75
Comp. Ref. Ex. 4	Sample 8	THF	0.45	0.4	1.13
Comp. Ref. Ex. 5	Sample 9	THF	0.45	0.2	2.25

Table 2-(3)

	Photo-receptor	Image qualities		VL(-V)		ΔVL (VLe-VLs) (-V)
		Back-ground fouling	Image density	At the start of test (VLs)	At the end of test (VLe)	
Ex. 2	Ex. 2	○	○	85	95	10
Ex. 4	Ex. 4	○	○	95	105	10
Comp. Ex. 3	Comp. Ex. 3	×	×	100	170	70
Comp. Ex. 5	Comp. Ex. 5	×	×	120	180	60
Ref. Ex. 3	Sample 1	○	○	80	90	10
Ref. Ex. 4	Sample 2	○	○	85	95	10
Comp. Ref. Ex. 1	Sample 5	○	×	95	145	50
Ref. Ex. 5	Sample 3	○	○	100	115	15
Ref. Ex. 6	Sample 4	○	○	105	125	20
Comp. Ref. Ex. 2	Sample 6	○	×	105	160	55
Comp. Ref. Ex. 3	Sample 7	×	×	115	160	45
Comp. Ref. Ex. 4	Sample 8	×	×	120	175	55
Comp. Ref. Ex. 5	Sample 9	×	×	125	205	80

It is clear from Tables 2-(2) and 2-(3) that the image qualities and VL are closely related to the ratio of the average particle diameter to the surface roughness. The relationship between the ratio (i.e., average particle diameter / surface roughness) and ΔVL is illustrated in FIG. 17 below.

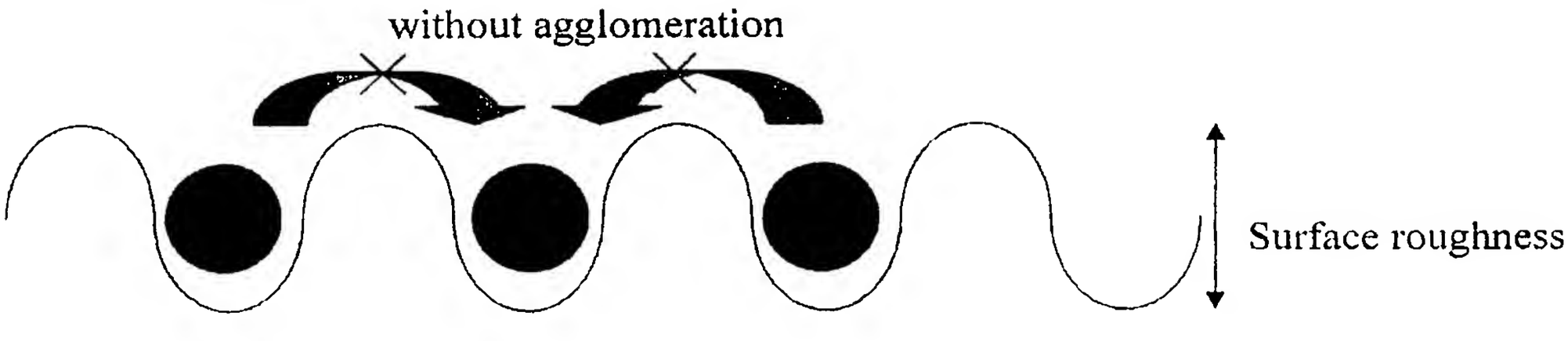
FIG. 17



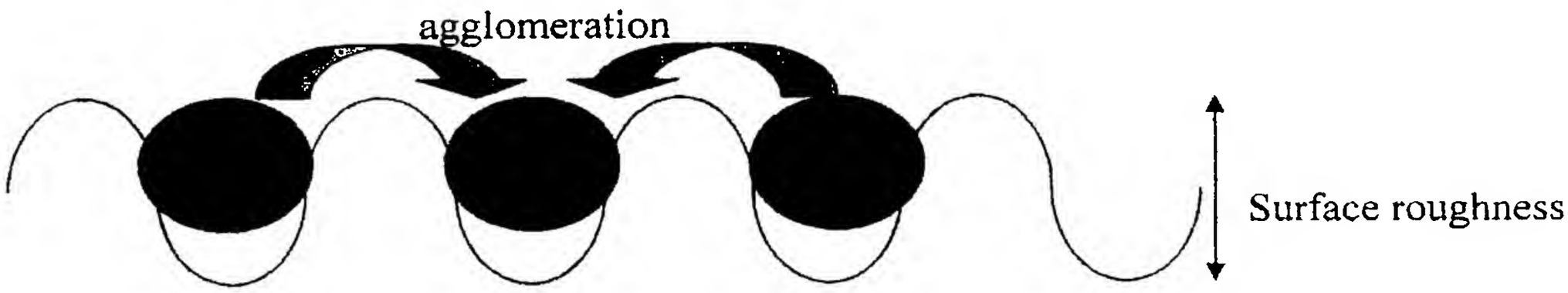
The vertical dotted line is drawn at a point where the ratio is 2/3. It is clear from FIG. 17 that when the ratio is greater than 2/3, the potential difference (ΔVL) rapidly increases.

The reason why such evaluation results are produced is considered to be as follows.

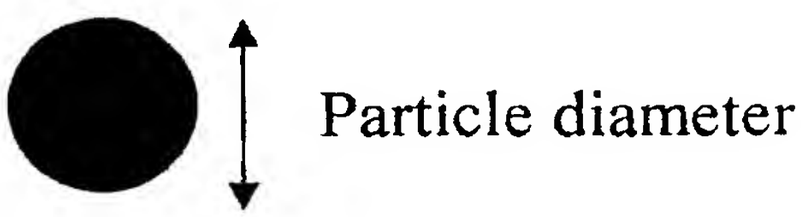
When the ratio is less than 2/3 (case 1, illustrated below), the particles of the pigment do not agglomerate. In contrast, when the ratio is greater than 2/3 (case 2, illustrated below), the particles of the pigment agglomerate.



Case1: Particle diameter/ Surface roughness < 2/3



Case2: Particle diameter/ Surface roughness >2/3



4. The undersigned petitioner declares further that all statements made herein of his own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of this application or any patent issuing thereon.

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5. Further deponent saith not.

Tatsuya Iriumi

Signature

December 4. 2008.

Date

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